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| 1. If two ladders are placed end to end, their combined height is 46 feet. One ladder is 3 feet shorter than the other ladder. What are the heights of the two ladders?  ​   |  |  |  | | --- | --- | --- | |  | a. | 21.5 feet and 24.5 feet | |  | b. | 23 feet and 26 feet | |  | c. | 24.5 feet and 27.5 feet | |  | d. | 21.5 feet and 18.5 feet | |  | e. | 46 feet and 43 feet |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 2. What is the 50th decimal digit in the decimal representation of ?  ​   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 8 | |  | c. | 9 | |  | d. | 2 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 3. Using the map below, determine the number of direct routes (no backtracking) from point A to point B if you want to pass by point F.  ​  ​   |  |  |  | | --- | --- | --- | |  | a. | 5 | |  | b. | 8 | |  | c. | 7 | |  | d. | 6 | |  | e. | 9 |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 4.  Morris Mouse can easily find his way through the maze from the entrance A to the exit B. However, he only receives food if he finds the exit without going west or south. (North is towards the top of the page.) How many different paths can he take through the maze to receive food? (Note: Different paths have at least one distinct section. See the diagram for an example.)       |  |  |  | | --- | --- | --- | |  | a. | 252 | |  | b. | 15,120 | |  | c. | 30,240 | |  | d. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | |

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| 5. Suppose 35 points are placed around a circle. A line segment is drawn between each pair of points. How many line segments are drawn?  ​   |  |  |  | | --- | --- | --- | |  | a. | 1,190 | |  | b. | 1,225 | |  | c. | 630 | |  | d. | 35 | |  | e. | 595 |  |  |  | | --- | --- | | *ANSWER:* | e | |

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| 6. A parking lot contains a total of 52 cars and motorcycles.  There are a total of 180 tires (not counting spare tires) in the lot.  Assuming each car has 4 tires and each motorcycle has 2 tires, determine how many cars and how many motorcycles are in the parking lot.  ​   |  |  |  | | --- | --- | --- | |  | a. | 38 motorcycles and 14 cars | |  | b. | 14 motorcycles and 38 cars | |  | c. | 26 motorcycles and 26 cars | |  | d. | 6 motorcycles and 46 cars | |  | e. | 22 motorcycles and 30 cars |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 7. Determine the units digit of .  ​   |  |  |  | | --- | --- | --- | |  | a. | 8 | |  | b. | 0 | |  | c. | 2 | |  | d. | 4 | |  | e. | 6 |  |  |  | | --- | --- | | *ANSWER:* | d | |

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| 8. The UCSB has 7 squads of badminton players. The UCI team has 6 squads. Every squad from UCSB must play every squad from UCI at least once. What is the least number of games that must be played?  ​   |  |  |  | | --- | --- | --- | |  | a. | 13 | |  | b. | 42 | |  | c. | 20 | |  | d. | 48 |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 9. In a chess tournament, each player played a game in the first round. The losers dropped out. This process continued until a winner was declared. The winner of the tournament played 9 games. How many people were in the tournament?​   |  |  | | --- | --- | | *ANSWER:* | 256 | |

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| 10. Use the graph below, which shows the average number of weekly viewers of a 30-minute television program (in millions of viewers) from 2000 to 2006.  Find the change in the average number of weekly viewers from 2000 to 2004.  ​   |  |  |  | | --- | --- | --- | |  | a. | –5 million | |  | b. | no change | |  | c. | 5 million | |  | d. | –10 million | |  | e. | 10 million |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 11. A baseball team has won more than 94% (but less than 100%) of its games in a season.What is the least possible number of games that the team could have played in the season?  ​   |  |  |  | | --- | --- | --- | |  | a. | 16 | |  | b. | 17 | |  | c. | 18 | |  | d. | 19 | |  | e. | 20 |  |  |  | | --- | --- | | *ANSWER:* | b | |

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| 12. On three examinations, a student received scores of 71, 80, and 75.  What score will the student need on the fourth examination to have an average of 81?  ​   |  |  |  | | --- | --- | --- | |  | a. | 76 | |  | b. | 75 | |  | c. | 98 | |  | d. | 81 | |  | e. | 80 |  |  |  | | --- | --- | | *ANSWER:* | c | |

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| 13. Following the pattern shown in the number sequence below, what is the missing number?  You may find it helpful to list perfect squares or cubes beneath the sequence terms to try to see how they may relate to the sequence.  ​  ​   |  |  |  | | --- | --- | --- | |  | a. | 51 | |  | b. | 343 | |  | c. | 49 | |  | d. | 344 | |  | e. | 50 |  |  |  | | --- | --- | | *ANSWER:* | e | |

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| 14. How many digits does it take in total to number a book from page 23 to page 877?  ​   |  |  |  | | --- | --- | --- | |  | a. | 518 | |  | b. | 854 | |  | c. | 2,488 | |  | d. | 523 | |  | e. | 385,003 |  |  |  | | --- | --- | | *ANSWER:* | c | |